



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

W

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,182	11/10/2003	Stephen Moffatt	AM-3708.C1	4654

7590
Patent Counsel
Applied Materials, Inc.
P.O. Box 450 A
Santa Clara, CA 95052

EXAMINER

SMITH, JOHNNIE L

ART UNIT PAPER NUMBER

2881

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/705,182

Applicant(s)

MOFFATT, STEPHEN

Examiner

Johnnie L Smith II

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1203.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-9, 11-14, 17, 19, 21, 23-40 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent 5,452,177 (Frutiger). In reference to claims 1 and 36, Frutiger teaches a wafer holder for retaining a substrate within a processing chamber comprising: an electrode; and one or more layers covering a portion of the wafer holder in contact with the wafer where at least one of the layers is compliant, and an apparatus for handling a substrate for use in semiconductor processing comprising: a wafer holder; and one or more layers covering a portion of the wafer holder in contact with the wafer where at least one of the layers is compliant (column 4 lines 44-55).

3. In reference to claims 2-4, 6, and 37-40, Frutiger teaches a chuck wherein the compliant layer has a hardness between 25 and 100 Shore Hardness scale A; wherein the compliant layer is an insulator having a dielectric constant between 1

and 3; wherein the compliant layer can withstand 10% shear stress without exceeding the yield strength of the complaint layer material; and wherein the compliant layer comprises an insulative material (column 7 Lines 30-64).

4. In reference to claim 5, Frutiger teaches a chuck wherein the electrode comprises at least one conductive material selected from the group consisting of: copper, nickel, chromium, aluminum, iron, and mixtures or alloys thereof (column 9 lines 40-45). In reference to claim 7, Frutiger teaches a chuck wherein the compliant layer is between 1 and 3 μm thick.

5. In reference to claim 8, Frutiger teaches an apparatus for projecting patterned charged particles onto a substrate comprising: a processing chamber; a charged particle source for generating a charged particle beam that impinges on the substrate; and an electrostatic chuck comprising an electrode and one or more layers covering a portion of the wafer holder in contact with the wafer where at least one of the layers is compliant (column 4 lines 40-55).

6. In reference to claims 9, 11, 12, and 14, Frutiger teaches an apparatus wherein the compliant layer has a hardness between 25 and 100 Shore Hardness scale A; wherein the compliant layer is an insulator having a dielectric constant between 1 and 3; wherein the compliant layer can withstand of 10% shear to stress

without exceeding the yield strength of the compliant layer material; and wherein the compliant layer comprises an insulative material (column 7 lines 30-64).

7. In reference to claim 13, Frutiger teaches an apparatus wherein the electrode is comprises an conductive material selected from the group consisting of copper, nickel, chromium, aluminum, iron, and mixtures or alloys thereof (column 9 lines 40-45). In reference to claim 17, Frutiger teaches an apparatus wherein the compliant layer is between 1 and 10 μm thick (column 7 line 56-column 8 line 12).

8. In reference to claim 19, Frutiger teaches a method for patterning a photoresist layer on a substrate comprising the steps of forming a photoresist layer on the substrate; positioning the substrate on an electrostatic chuck having one or more layers covering a portion of the wafer chuck in contact with the wafer where at least one of the layers is compliant; and exposing portions of the photoresist layer on the substrate to a charged particle beam (column 4 lines 40-55).

9. In reference to claims 21, 23, and 28, Frutiger teaches a method of claim wherein the compliant layer has a hardness between 25 and 75 Shore Hardness scale A; wherein the compliant layer is an insulator having a dielectric constant between 1 and 3; and wherein the compliant layer comprises an insulative material (column 7 lines 30-64).

10. In reference to claim 29, Frutiger teaches a method for holding a wafer on a chuck having an electrode and one or more layers covering a portion of the wafer holder in contact with the wafer where at least one of the layers is compliant comprising the steps of placing the wafer on one of the layers of the chuck; and energizing the electrode (column 4 lines 40-67).

11. In reference to claims 30-32, and 34, Frutiger teaches a method wherein the compliant layer has a hardness between 25 and 100 Shore Hardness scale A; wherein the compliant layer is an insulator having a dielectric constant between 1 and 3; wherein the compliant layer can withstand 10% shear stress without exceeding the yield strength of the compliant layer material; and wherein the compliant layer comprises an insulative material (column 7 lines 30-64).

12. In reference to claim 33, Frutiger teaches a method wherein the electrode comprises at least one conductive material selected from the group consisting of: copper, nickel, chromium, aluminum, iron, and mixtures or alloys thereof (column 9 lines 40-45). In reference to claim 35, Frutiger teaches a method wherein the compliant layer is between 1 and 10 μm thick (column 7 line 56-column 8 line 12).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 10, 15, 16, 18, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent 5,452,177 (Frutiger) in view of US patent 5,581,324 (Miyai et al). In reference to claims 10, 16, 18, and 20, Frutiger discussed above discloses all base elements upon which the claims depend, but failed to clearly teach an apparatus further comprising: a computer for calculating an estimated charged particle beam deflection to compensate for the actual deformation of the substrate caused by the exposure of the substrate to the charged

particle beam; a substrate temperature sensor for measuring the temperature of the substrate during processing and for sending a signal corresponding to the measured substrate temperature to the computer; and wherein localized heating of the substrate due to exposure to the charged beam is between 1 ° C and 50° C. Such limitations can be found in the teachings of Miyai et al (column 3 lines 5-65).

16. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Frutiger with the disclosure of Mayai for the purpose of calculating a thermal deformation amount of the pattern area when the pattern area thermally deforms upon absorption of the illumination light while a position, in the reference plane, of a predetermined reference point in the pattern area is fixed as taught in Mayai et al.

17. In reference to claims 15 and 22, Frutiger discussed above discloses all base elements upon which the claims depend, but failed to clearly teach an apparatus comprising: a lithography mask positioned between the charged particle source and the substrate; and an electron sensor disposed within the processing chamber for detecting backscattered electrons emanating from the substrate, and using a charged particle beam to scan a first mark on a photo lithography mask onto a second mark on said substrate; detecting backscattered electrons; determining the position of the substrate using the detected backscattered electrons; and deflecting

the charged particle beam in response to the measured position of the substrate.

Such limitations can be found in the teachings of Miyai et al (figure 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Frutiger with the disclosure of Mayai so that the best imaging plane of the projection optical system can coincide with the wafer surface as taught in Mayai et al.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patents: 4,920,505 (Suzuki), 5,729,423 (Donde et al), 4,480,284 (Tojo et al), 4,665,463 (Ward et al), 5,310,453 (Fukasawa et al), and 5,883,778 (Sherstinsky et al). All of the cited US patents contain art similar to that being claimed by applicant, more specifically, methods and apparatuses having electrostatic chucks.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johnnie L Smith II whose telephone number is 571-272-2481. The examiner can normally be reached on Monday-Thursday 7-4 P.M. and Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571-272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


JLSII

Johnnie L Smith II
Examiner
Art Unit 2881


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800